

August 22, 2001

MEMORANDUM FOR: Andrew J. Lindsay  
Project Director, Survey Section A

FROM: Charles W. Challstrom  
Director, National Geodetic Survey

SUBJECT: INSTRUCTIONS: Pennsylvania ANA 2001  
GPS-1614, Task Number: BK6C0400

GENERAL:

Specifications for Area Navigation Approach (ANA) surveys to establish geodetic control on airports are outlined below and in referenced documents. This survey will observe and/or set Primary and Secondary Airport Control Stations (PACS and SACS) at the two airports in Pennsylvania listed in Attachment 1. The surveyor is responsible for all reconnaissance, mark setting as required, digital mark descriptions and recovery notes, survey observations, data processing, quality control, data submission, and reporting.

PURPOSE:

PACS and SACS will provide local geodetic control to support high-accuracy surveys of airport features and obstructions using both GPS and optical survey equipment. Ties to existing Continuously Operating Reference Stations (CORS), bench marks, and High Accuracy Reference Network (HARN) stations will provide data for a more accurate adjustment to the National Spatial Reference System (NSRS).

STANDARDS

The required accuracy standards for PACS and SACS are contained in FAA Number 405, "Standards for Aeronautical Surveys and Related Products," Fourth Edition, Appendix 5. Success in meeting accuracy standards will be based upon analysis of repeated baselines, loop misclosures, and free-adjustment residuals, and by comparison with prior high-accuracy surveys.

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# SPECIFICATIONS:

In these Project Instructions and any Supplemental Instructions, the terms "must," "shall," and "will" state a requirement. The term "should" indicates a recommendation.

This survey shall be conducted in compliance with standards and specifications within the following references. In the case of conflicting statements, these Project Instructions shall have first priority, followed by the references in the order listed.

1. "FAA No. 405, Standards for Aeronautical Surveys and Related Products," 4th edition, FAA/NGS, September 1996.  
(abbr: FAA 405)
2. "General Specifications for Aeronautical Surveys," Vol I, "Establishment of Geodetic Control on Airports," 1<sup>st</sup> Edition, June 2000.
3. "Input Formats and Specifications of the National Geodetic Survey Data Base," (with changes dated April 1, 1998)" FGCS, volumes I - III, 1994. (abbr: Blue Book)
4. "NOAA Manual NOS NGS 1, Geodetic Bench Marks," NGS, 1978.  
(abbr: BM Manual)
5. ADJUST Software, version 4.02; and NOAA Technical Memorandum NOS NGS-47, "ADJUST: THE HORIZONTAL OBSERVATION ADJUSTMENT PROGRAM," 1987.
6. WDDPROC Software, version 4.00 (14DEC00); and "DDPROC DESCRIPTIVE DATA PROCESSING SYSTEM," Version 2.00, 1992.
7. DOT/FAA Advisory Circular No. 150/5340-1G, "STANDARDS FOR AIRPORT MARKINGS," 1993.
8. DOT/FAA/AS-90-3, "A GUIDE TO GROUND VEHICLE OPERATIONS ON THE AIRPORT," 1990.
9. DOT/FAA Advisory Circular No. 150/5340-18C, "STANDARDS FOR AIRPORT SIGN SYSTEMS," 1991.
10. FGCC publication, Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques. Version 5.0, August, 1989, Appendix H.

RECONNAISSANCE INSTRUCTIONS:

Follow the Reconnaissance Requirements in section 2 of the General Specifications. Reconnaissance will include meeting with airport management to discuss the project and any planned construction or changes to the airport. All USC&GS, NGS, and NOS marks on the airport shall be recovered. Proper site selection for PACS and SACS is a primary goal for this survey and must be carefully considered. PACS and SACS selection guidelines are listed in section 2.4 of the General Specifications. Collecting digital photographs of the PACS and SACS is required, as specified in "REQUIREMENTS FOR DIGITAL PHOTOGRAPHS OF SURVEY MARKS AND CORS ANTENNAS", MAY 16, 2001.

Full, three paragraph, NGS format station descriptions must be written for any station occupied during this survey that does not have an updated description in the NGS database. A station must not be reported as "Recovered as Described" unless an accurate three paragraph description resides in the NGS database. Any recovered station without a NGS PID number requires an original description written for it.

The Supplemental Instructions requirement to submit a preliminary reconnaissance report is waived for NGS field parties. The following reconnaissance information, as described in section 2.7 of the Supplemental Instructions, will be submitted with the final project report:

1. Station Table.
2. Airport Summary Report.
3. Airport Sketches with PACS and SACS plotted.
4. Station Descriptions and Recovery Notes will be submitted in digital format with the final project report.

MARK SETTING:

Follow procedures in General Specifications, Section 3.

DATA COLLECTION AND PROCESSING:

The nature of this project requires that all survey data be of the highest possible quality to ensure the safety of the national airspace system.

Data collection shall be accomplished using FGCS-tested GPS receivers. NGS software programs PAGES and ADJUST are required for final data processing.

Data collection shall utilize static GPS survey methods employing dual-frequency receivers. GPS data shall be collected at 15- OR 30-second epoch intervals and converted to RINEX, version 2 format. Raw data shall be saved. Observing windows shall be selected, and modified as necessary, to maximize satellite visibility for each session.

Detailed recommendations and requirements for observing PACS and SACS are contained in the General Specifications, Section 4.

DATA SUBMISSION:

The project report and all survey data shall be organized and submitted to the Field Operations Branch in accordance with the references above. All records for this project shall be archived under the title "PENNSYLVANIA ANA 2001". The project number (accession number) is GPS-1614. Digital files shall be archived under filename "paap081d.878".

The following supporting material will be provided by N/NGS21:

1. List of airports to be surveyed.
2. List of ANA Suitable NSRS stations within a 2-mile radius of airport.

LIAISON:

For concerns regarding survey field operations, contact:

William T. McLemore, Jr.  
Chief, Field Operations Branch, N/NGS41  
Observation and Analysis Division  
SSMC3/Station 8564

1315 East-West Highway  
Silver Spring, MD 20910-3282  
PHONE: (301)713-3215  
FAX: (301)713-4327  
E-mail: Bill.McLemore@noaa.gov

For concerns regarding survey design or specifications,  
contact:

Robert J. Siclari  
Project Development Branch, N/NGS21  
Spatial Reference System Division  
SSMC3/Station 8735  
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PHONE: (301)713-3194  
FAX: (301)713-4324  
E-mail: Bob.Siclari@noaa.gov

The contact point for all inquiries about the Supplemental  
Instructions is:

LT Todd A. Haupt, NOAA  
Field Operations Branch, N/NGS41  
Observation and Analysis Division  
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E-mail: Todd.A.Haupt@noaa.gov

Questions and problems concerning adjustment processing should  
be directed to:

Maralyn L. Vorhauer  
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Questions and problems concerning vector processing should be directed to:

Juliana Blackwell  
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The contact point for the Pennsylvania Bureau of Aviation is:

William A. Shaffer, Director  
Pennsylvania Department of Transportation  
Bureau of Aviation  
400 North Street, 6<sup>th</sup> Floor  
Harrisburg, Pennsylvania 17120-0064  
PHONE: (717)705-1260  
FAX: (717)705-1255  
E-mail: shaffwi@dot.state.pa.us

ADDRESS:

Keep the Field Operations Branch informed of the party's physical address and telephone number at all times.

PUBLICITY:

See "NGS Operations Handbook," Section 1.4.1.

EXPENSES:

Expenses for this project will be charged to Task Number BK6C0400.

TRAVEL:

Travel and per diem are authorized in accordance with Federal Travel Regulations, Part 301-11, Per Diem Allowances. Current per diem rates were effective October 1, 2000.

ACKNOWLEDGEMENT:

Please acknowledge receipt of these instructions in the Monthly Report and Journal.

## Attachments

cc: N/NGS - D. Zilkoski  
N/NGS - S. Misenheimer (first page only)  
N/NGS - D. Milbert  
N/NGS1 - G. Mitchell (first page only)  
N/NGS11 - S. Cofer  
N/NGS21 - S. Frakes  
N/NGS21 - R. Anderson  
N/NGS4 - E. Wade  
N/NGS4 - M. Vorhauer  
N/NGS4 - D. Hoar  
N/NGS41 - W. McLemore  
N/NGS41 - J. Blackwell  
N/NGS41 - T. Haupt  
FGCS Members (first page only)  
Pennsylvania Bureau of Aviation - William A. Shaffer

PENNSYLVANIA AIRPORTS

1. Altoona-Blair County Airport (AOO)  
Nearest FBN station is BOSSLER (PID KX2360)
2. Williamsport Regional Airport (IPT)  
Nearest FBN station is N 353 (PID LZ0872)